

Phoebus Architecture

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CS-Studio Collaboration

14 Sites which package site
specific CS-Studio products

Additionally, many users who
do not create their own
products.

Meet Our Team

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CS-Studio Collaboration

“When it does not work, I hate it.”

“I am having real problems building our own CSS distribution starting from Eclipse Mars RC2”

“Big labs seem to have their experts but I'm under the impression that smaller labs are struggling and so am I when "my expert" is not available.”

“Spend a long time to start a product in Eclipse and Export it.”

The goal is to reduce the barrier of entry for new developers

- A simple Build
- A development environment that is easy to setup and use
- Use generic tools and technologies available as part of the java ecosystem

The Build

Eclipse build system

PDE build system

- Slow and Complex
- Cryptic error messages

Tycho build system

- Slower
- Even more complex
- Difficult to reproduce builds

The screenshot shows the Jenkins web interface for a pipeline build. The browser address bar indicates the URL is `130.199.219.89:8080/job/cs-studio/job/build/`. The page title is "Pipeline build" and the full project name is "cs-studio/build". There are buttons for "add description" and "Disable Project".

Last Successful Artifacts

| Artifact Name | Size | View |
|--|-----------|----------------------|
| <code>cs-studio-nls2-\$(nls2_version)-linux.gtk.x86.tar.gz</code> | 199.27 MB | view |
| <code>cs-studio-nls2-\$(nls2_version)-linux.gtk.x86_64.tar.gz</code> | 199.38 MB | view |
| <code>cs-studio-nls2-\$(nls2_version)-macosx.cocoa.x86_64.zip</code> | 199.46 MB | view |
| <code>cs-studio-nls2-\$(nls2_version)-win32.win32.x86.zip</code> | 199.90 MB | view |
| <code>cs-studio-nls2-\$(nls2_version)-win32.win32.x86_64.zip</code> | 199.93 MB | view |

Recent Changes

Stage View

Average stage times: (Average full run time: ~53min 43s)

| Stage | Declarative: Checkout SCM | Declarative: Agent Setup | Build | setup-repo | dlirt | maven-osgi-bundles | cs-studio-thirdparty | cs-studio | product | nls2-product | Declarative: Post Actions |
|--------------------------|---------------------------|--------------------------|-------|------------|----------|--------------------|----------------------|-----------|----------|--------------|---------------------------|
| 1 (May 23 15:23 commit) | 917ms | 1s | 741ms | 893ms | 5min 52s | 2min 56s | 2min 56s | 31min 11s | 3min 9s | 7min 13s | 15s |
| 2 (May 18 12:10 commits) | 550ms | 2s | 593ms | 856ms | 4min 42s | 1min 51s | 2min 24s | 30min 7s | 3min 35s | 7min 57s | |

CS-Studio

Phoebus build system

- Fast
- Easy
- Modular
- Reproducible
- Unit, Integration, & GUI tests

Fast & Simple Build

clone the sources

git clone <https://github.com/shroffk/phoebus.git>

build using maven

mvn clean install

or

build using ant

ant clean run

Support Multiple build technologies
ant & maven

Support Multiple CI solutions
Travis & AppVeyor



```
[INFO] Executed tasks
[INFO] -----
[INFO] Reactor Summary:
[INFO] dependencies ..... SUCCESS [ 1.702 s]
[INFO] phoebus 0.0.1-SNAPSHOT ..... SUCCESS [ 0.009 s]
[INFO] core ..... SUCCESS [ 0.007 s]
[INFO] framework ..... SUCCESS [ 0.591 s]
[INFO] util ..... SUCCESS [ 0.270 s]
[INFO] vtype ..... SUCCESS [ 0.146 s]
[INFO] pv ..... SUCCESS [ 0.142 s]
[INFO] ui ..... SUCCESS [ 0.197 s]
[INFO] logging ..... SUCCESS [ 0.078 s]
[INFO] types ..... SUCCESS [ 0.073 s]
[INFO] formula ..... SUCCESS [ 0.087 s]
[INFO] applications ..... SUCCESS [ 0.011 s]
[INFO] logbook ..... SUCCESS [ 0.011 s]
[INFO] inmemory ..... SUCCESS [ 0.064 s]
[INFO] olog ..... SUCCESS [ 0.095 s]
[INFO] logbook ui ..... SUCCESS [ 0.065 s]
[INFO] probe ..... SUCCESS [ 0.066 s]
[INFO] greeting-app ..... SUCCESS [ 0.070 s]
[INFO] putable ..... SUCCESS [ 0.100 s]
[INFO] putree ..... SUCCESS [ 0.098 s]
[INFO] logConfiguration ..... SUCCESS [ 0.081 s]
[INFO] email ..... SUCCESS [ 0.070 s]
[INFO] rtplot ..... SUCCESS [ 0.175 s]
[INFO] databrowser ..... SUCCESS [ 0.298 s]
[INFO] display ..... SUCCESS [ 0.008 s]
[INFO] display-model ..... SUCCESS [ 0.590 s]
[INFO] display-representation ..... SUCCESS [ 0.081 s]
[INFO] display-representation-javafx ..... SUCCESS [ 0.230 s]
[INFO] display-runtime ..... SUCCESS [ 0.171 s]
[INFO] display-editor ..... SUCCESS [ 0.190 s]
[INFO] alarm ..... SUCCESS [ 0.008 s]
[INFO] alarm-model ..... SUCCESS [ 0.095 s]
[INFO] alarm-ui ..... SUCCESS [ 0.109 s]
[INFO] alarm-server ..... SUCCESS [ 0.085 s]
[INFO] scan ..... SUCCESS [ 0.008 s]
[INFO] scan-model ..... SUCCESS [ 0.121 s]
[INFO] scan-client ..... SUCCESS [ 0.069 s]
[INFO] scan-ui ..... SUCCESS [ 0.132 s]
[INFO] scan-server ..... SUCCESS [ 0.151 s]
[INFO] file-browser ..... SUCCESS [ 0.068 s]
[INFO] Channel ..... SUCCESS [ 0.007 s]
[INFO] Channel Utility ..... SUCCESS [ 0.053 s]
[INFO] Channelfinder ..... SUCCESS [ 0.102 s]
[INFO] Channel Views ..... SUCCESS [ 0.093 s]
[INFO] product ..... SUCCESS [ 0.412 s]
[INFO] scan-server-product ..... SUCCESS [ 0.122 s]
[INFO] alarm-server-product 0.0.1-SNAPSHOT ..... SUCCESS [ 0.104 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 8.290 s
[INFO] Finished at: 2018-06-06T15:31:19-04:00
[INFO] -----
```

Modular Build

dependencies/
core/
 framework
 vtypes
 logging
 ui
 ...
applications/
 logbook
 databrowser
 channel
 ...
product/

The core modules contains services, utility functions, data type descriptions, and other pieces commonly needed by many applications.

The applications module is the parent module of various submodules, each dedicated to a particular application or tool

```
[INFO] Reactor Summary:
[INFO]
[INFO] core 0.0.1-SNAPSHOT ..... SUCCESS [ 0.011 s ]
[INFO] framework ..... SUCCESS [ 1.261 s ]
[INFO] util ..... SUCCESS [ 0.255 s ]
[INFO] vtype ..... SUCCESS [ 0.156 s ]
[INFO] pv ..... SUCCESS [ 0.147 s ]
[INFO] ui ..... SUCCESS [ 0.230 s ]
[INFO] logging ..... SUCCESS [ 0.079 s ]
[INFO] types ..... SUCCESS [ 0.067 s ]
[INFO] formula 0.0.1-SNAPSHOT ..... SUCCESS [ 0.099 s ]
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 2.554 s
[INFO] Finished at: 2018-06-06T15:37:24-04:00
[INFO]
```

```
[INFO] Reactor Summary:
[INFO]
[INFO] Channel 0.0.1-SNAPSHOT ..... SUCCESS [ 0.012 s ]
[INFO] Channel Utility ..... SUCCESS [ 1.124 s ]
[INFO] channelfinder ..... SUCCESS [ 0.211 s ]
[INFO] Channel Views 0.0.1-SNAPSHOT ..... SUCCESS [ 0.137 s ]
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 1.643 s
[INFO] Finished at: 2018-06-06T15:38:01-04:00
[INFO]
```

The Module can be build independently

- Simplifies development
- Site specific products can be assembled by building only those modules included in that product

Reproducible Builds

Clearly defined dependencies

eclipse

Dependencies

Required Plug-ins

Specify the list of plug-ins required for the operation of this plug-in.

- org.eclipse.ui
- org.eclipse.core.runtime
- org.csstudio.utility.batik
- org.csstudio.swt.xygraph (1.0.5)
- org.csstudio.ui.util (3.0.0)
- org.csstudio.java (3.0.0)
- org.eclipse.rap.ui
- org.csstudio.rap.ui.util (1.0.0)
- org.eclipse.gef (3.4.0)
- org.eclipse.rap.gef
- org.eclipse.rap.draw2d
- org.eclipse.rap.draw2d.compatibility
- org.apache.commons.lang
- org.csstudio.ui.util
- org.csstudio.rap.ui.util
- org.apache.batik.dom.svg
- org.apache.batik.util
- org.apache.batik.dom
- com.google.guava

Total: 19

phoebus

Dependencies

Dependencies

- jackson-core : 2.9.4
- jackson-annotations : 2.9.4
- jackson-databind : 2.9.4
- jersey-client : 1.19
- guava : 21.0

Add...
Remove
Properties...
Manage...

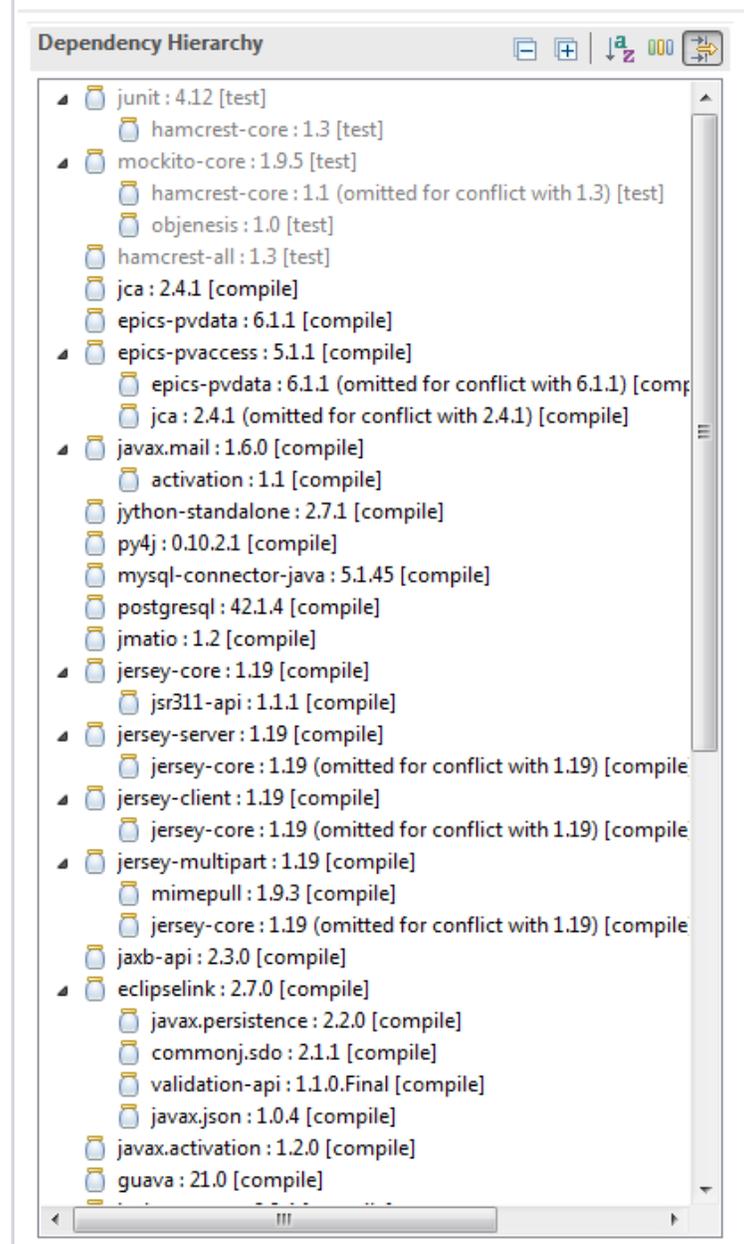
Reproducible Builds

Clearly defined dependencies

Maven is used to manage the dependency tree of all the Phoebus applications and their 3rd party dependencies

- Phoebus/dependencies
 - Produces a lib folder with all dependencies
 - The lib folder can be hosted as a zip
- *-Dmaven.repo.local*
 - Produces a maven repo with all dependencies
 - The repo folder can be hosted as a zip

Dependency Hierarchy [test]



Reproducible Builds

Target

Offline builds against well defined targets

Download the Phoebus build/runtime target

```
wget http://cs-studio.epics.gov/phoebus/lib.tar.gz
```

```
tar -xvf lib.tar.gz
```

```
ant clean run
```

Download the Phoebus development target (can include sources and javadocs)

```
wget http://cs-studio.epics.gov/phoebus-repo.tar.gz
```

Build (offline) against the downloaded target

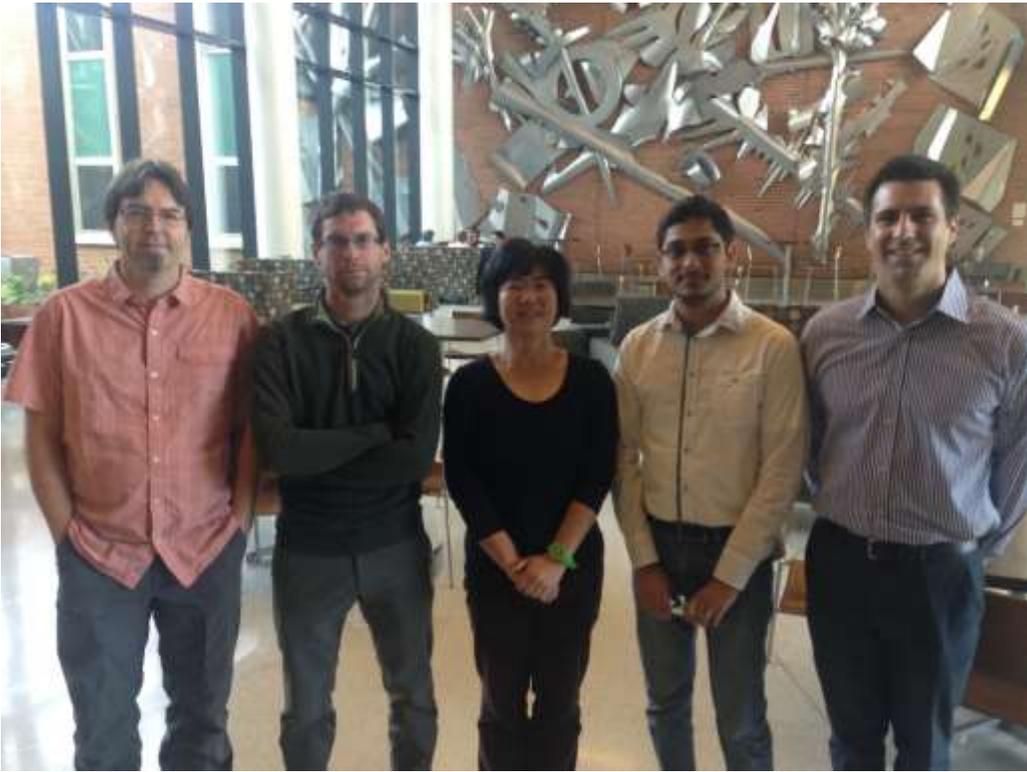
```
mvn clean install -Dmaven.repo.local=phoebus-repo
```

Your IDE of choice can be configured to use the above downloaded maven repo.

Simplified Development environment

CS-Studio san eclipse

- Easy to setup
- Developers can choose the IDE
- No prior knowledge required of eclipse and its internal API's

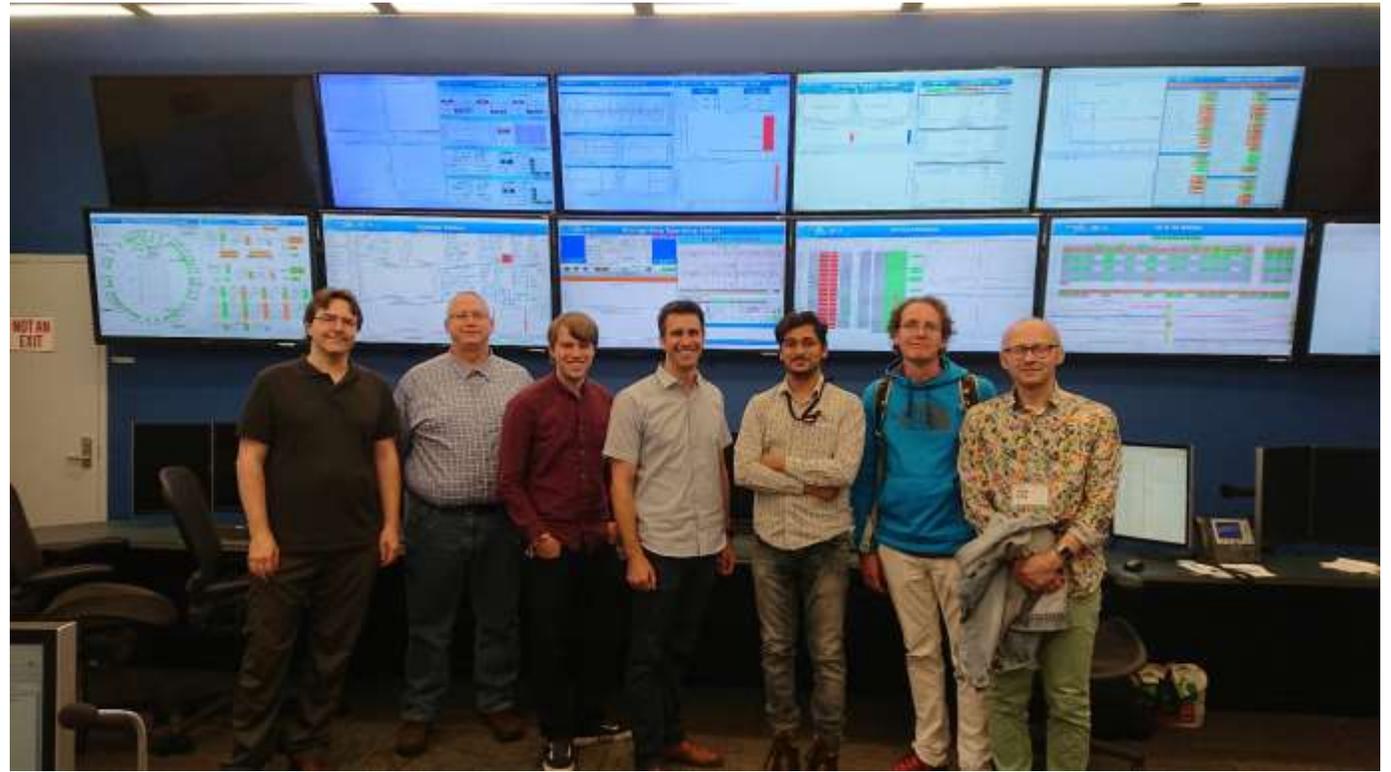


2016 code-a-thon at FRIB

Great coffee

Great beers, pretzels, and cracked fries at hop cat

3 days of struggling with setting up a reliable build and development environment



2018 code-a-thon at NSLSII

Ok Coffee

Ok beers, live music, and brick oven pizza at Patchogue brewery

Less than 3 hours to have everyone complete the build, test offline build, and set up development environment

Stepping out of the Shadow

From Eclipse to Phoebus

Moving from Eclipse to Phoebus

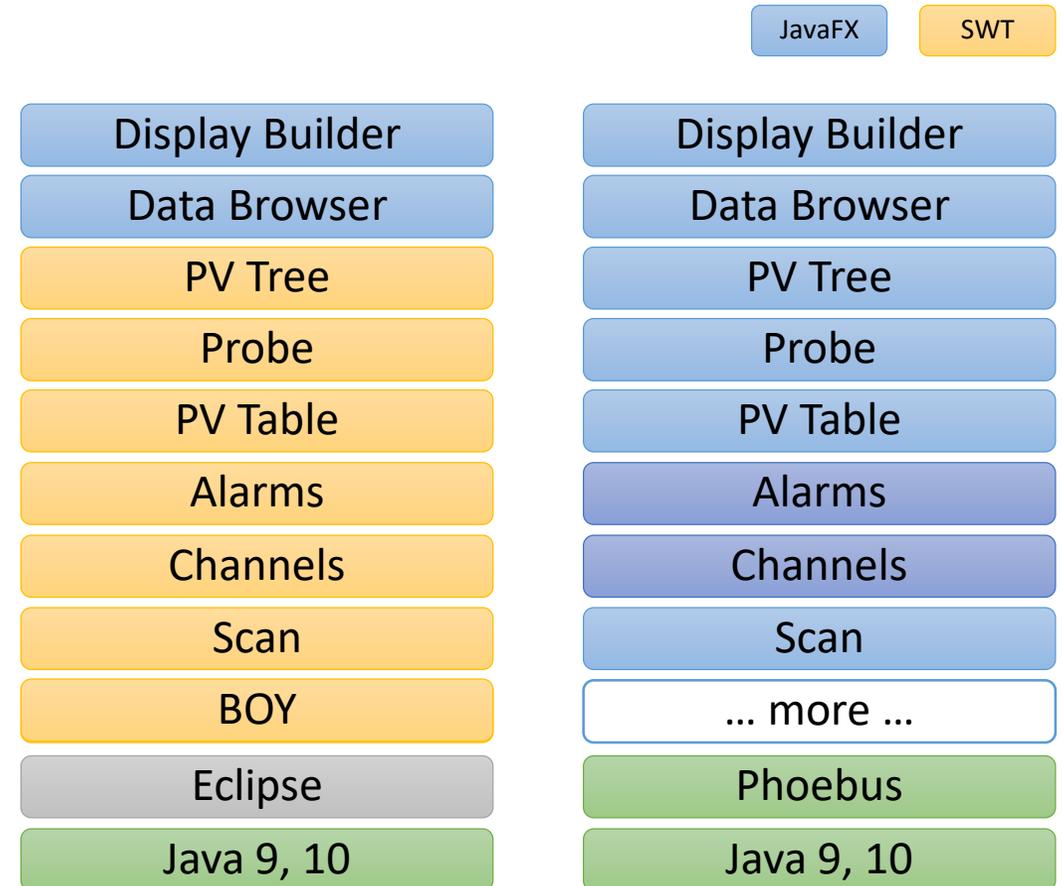
Goals

- Minimize the disruption for developers
- Make the transition easy for the users

Moving from Eclipse to Phoebus

Minimize the disruption

- The migration from eclipse to Phoebus will be a multi year process
 - Each application will be migrated individually.
 - Both the eclipse and phoebus based applications will be supported by the cs-studio community.
 - Each site will have the flexibility to define their time lines



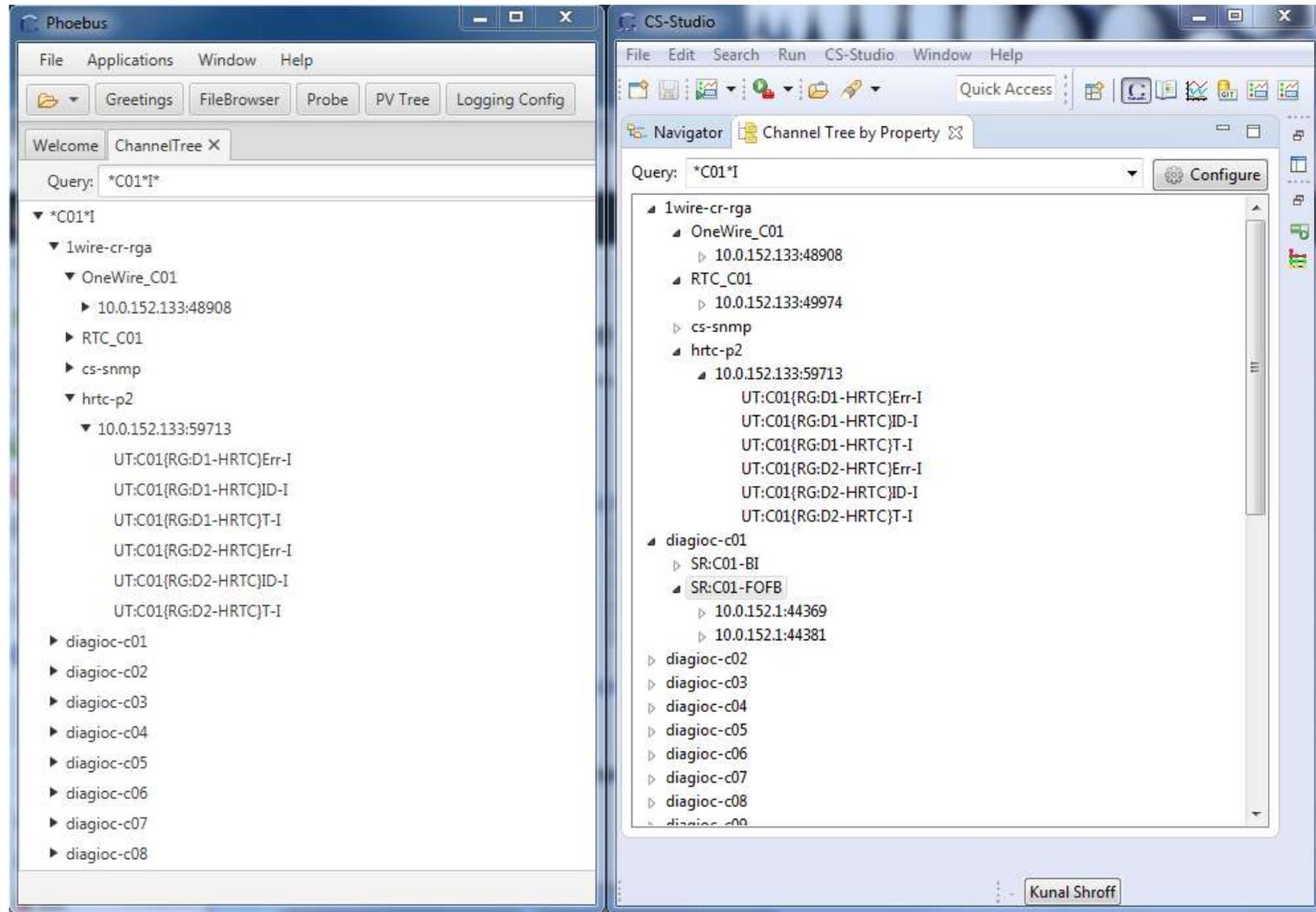
Current
CS-Studio 4.6

Final
CS-Studio 5

Moving from Eclipse to Phoebus

A easy transition

Many applications already use JavaFx Thus the look and feel of most of these will not change

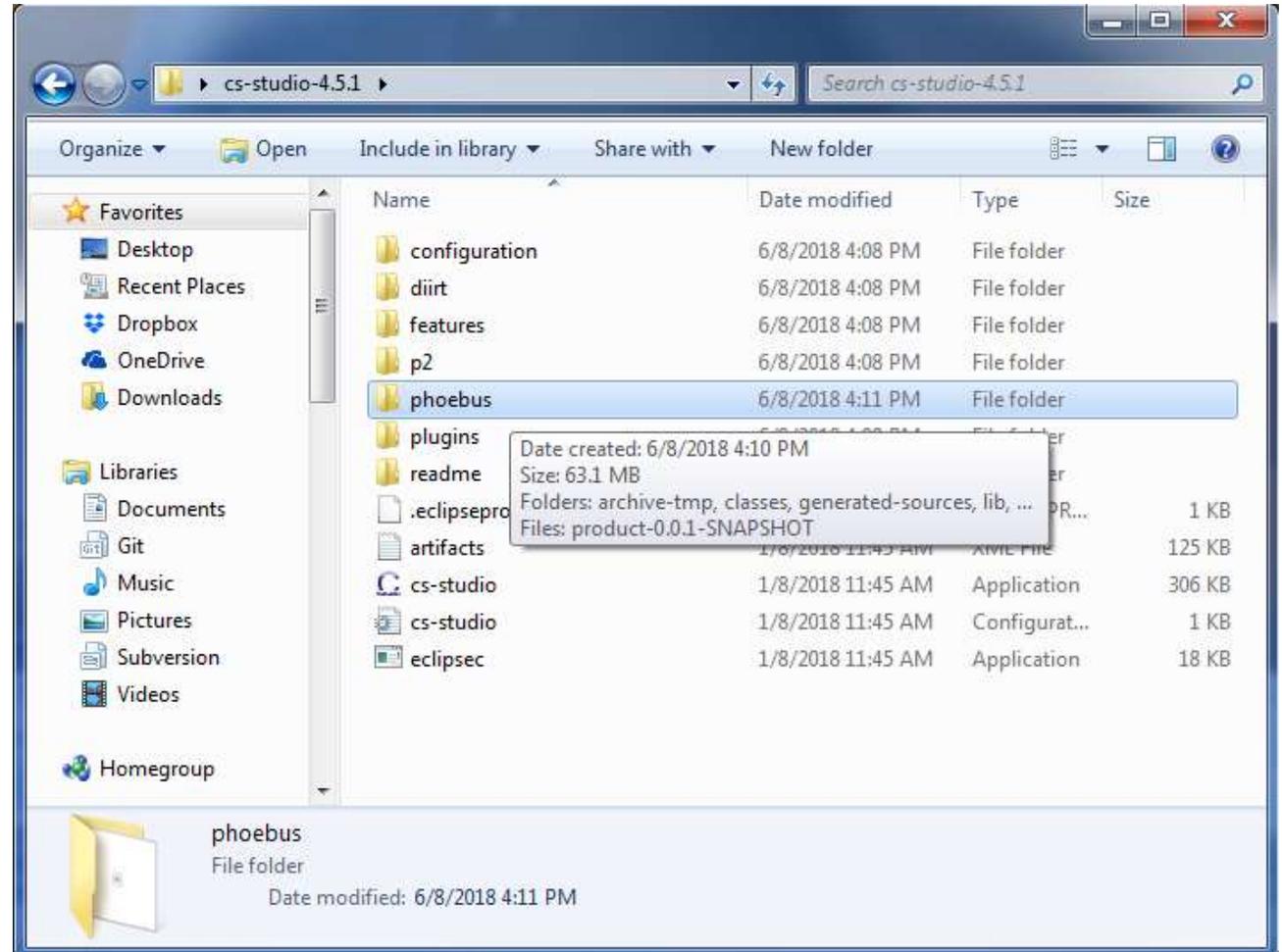


Moving from Eclipse to Phoebus

A easy transition

The Phoebus applications can be packaged with the existing eclipse applications into a single CS-Studio product

Developers can package the appropriate versions of each application to satisfy their site needs



Moving from Eclipse to Phoebus

Minimize the disruption for developers

Preserve the best features of the eclipse framework

- Extensible and Pluggable

 - Java SPI's

- Preferences

 - Java preferences

- Perspectives

- Jobs

- Selection

- Adapter

- Help

- ▷  org.phoebus.framework.adapter
- ▷  org.phoebus.framework.autocomplete
- ▷  org.phoebus.framework.jobs
- ▷  org.phoebus.framework.macros
- ▷  org.phoebus.framework.nls
- ▷  org.phoebus.framework.persistence
- ▷  org.phoebus.framework.preferences
- ▷  org.phoebus.framework.rdb
- ▷  org.phoebus.framework.selection
- ▷  org.phoebus.framework.spi
- ▷  org.phoebus.framework.util
- ▷  org.phoebus.framework.workbench

Phoebus Integration in Existing eclipse products

org.csstudio.phoebus.integration

A plugin which provides a service with methods for launching CS-Studio phoebus applications from inside existing CS-Studio/eclipse products

Launch various phoebus applications via

CS-Studio menu or toolbar actions

CS-Studio context menu actions using the selection

The screenshot shows the CS-Studio application window. The 'Display' menu is open, listing various visualization options. The 'Phoebus' option is highlighted, and a sub-menu is visible with the 'Launch Phoebus' option. In the background, a graph displays a series of red vertical bars, representing data points over time. The x-axis is labeled with timestamps from 11:36 to 11:56 on 2018-06-08.

| Show | Item (PV, Formula) | Display Name | Col... | Cursor Timestamp | Cur... | Scan Peri... | Buffer Size | Axis | Trace Type | Wi |
|-------------------------------------|--------------------|-----------------|--------|-------------------------|--------|--------------|-------------|---------|------------|----|
| <input checked="" type="checkbox"/> | SR:C01-VA:G6... | SR-C01-VA-G6... | | 2018-06-08 11:35:48.790 | 0.0 | 0.0 | 5000 | Value 2 | Area | 2 |

Context menu actions for the selected item:

- Add PV
- Add Formula
- Edit Selected Items
- Move Up
- Delete Item
- Move Down
- Remove Empty Axes
- Add Archive Data Source
- Use Default Archive Data Sources
- Export Samples
- Process Variable

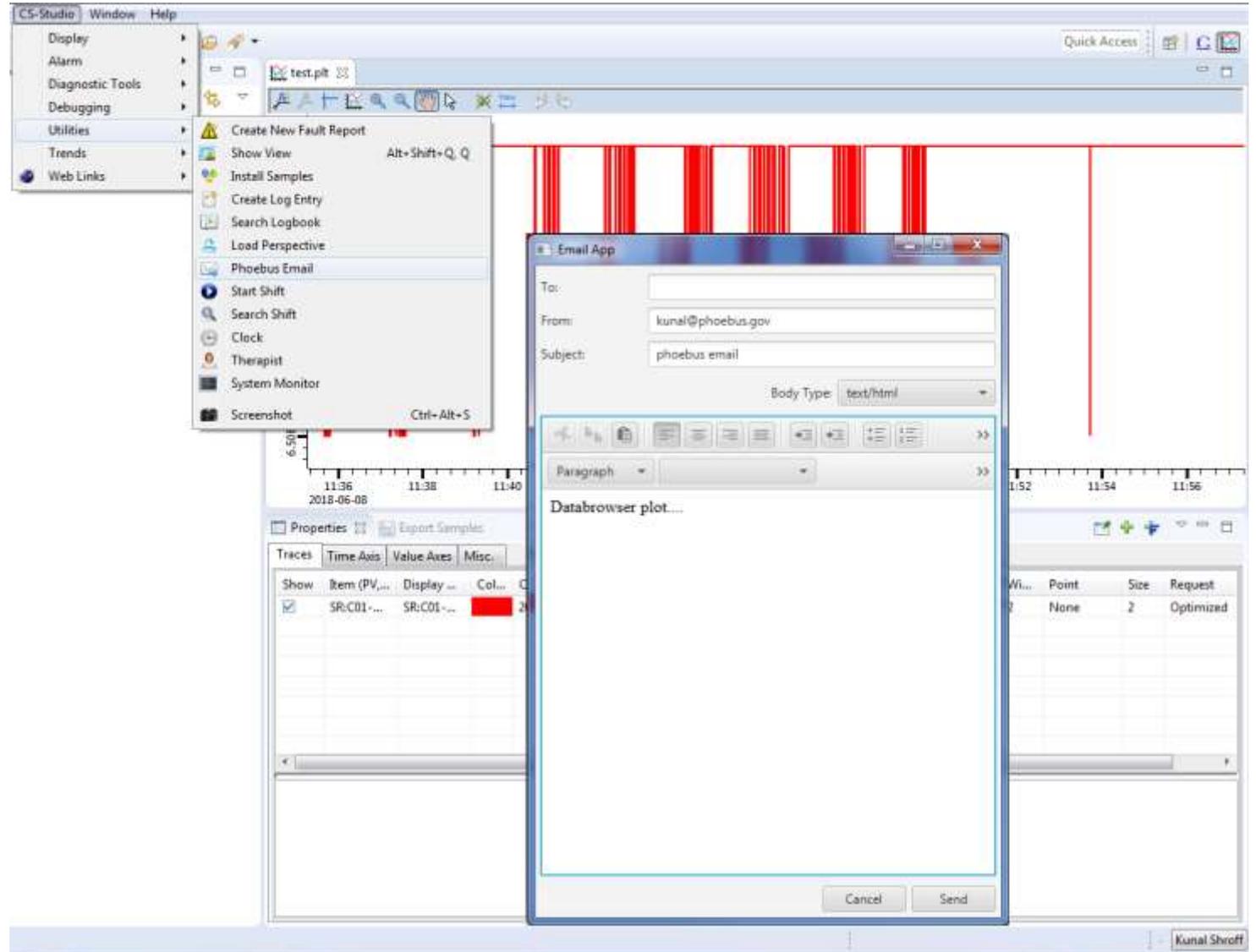
Process Variable sub-menu actions:

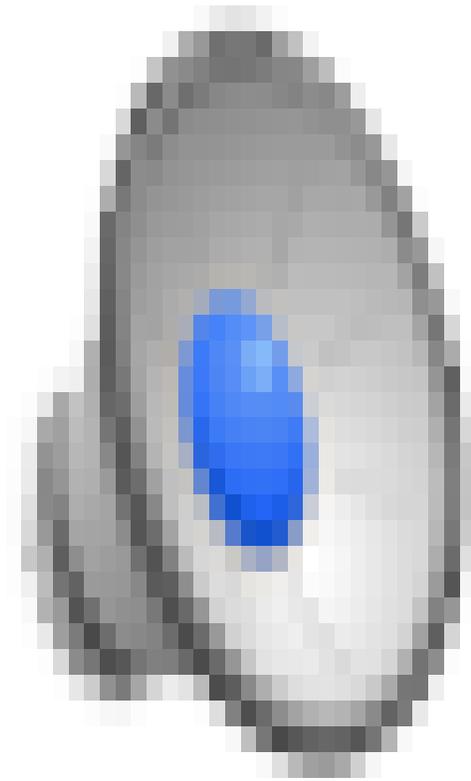
- Copy PV name to clip-board
- EPICS PV Tree
- Probe
- OPI Probe
- Phoebus Probe
- Phoebus PVTree
- Phoebus Channel Search
- Data Browser

Phoebus Integration in Existing eclipse products

When a users launches an application or a tool, the details of weather it a swt/javafx based eclipse application or a javafx based phoebus applications are transparent to the user.

e.g. The “send an email” or “create a log entry” will open the associated phoebus apps in a new window instead of the eclipse based ones.





Useful links

CS-Studio Phoebus

- <https://github.com/shroffk/phoebus>
- <http://phoebus-doc.readthedocs.io/en/latest/>

CS-Studio Phoebus Integration

- <https://github.com/ControlSystemStudio/cs-studio/issues/2437>

Questions?